

What is Claimed Is:

1. A system for performing electrical impedance tomography comprising:
a first set of electrodes positioned in a first plane;

a second set of electrodes positioned in a second plane;

a third set of electrodes positioned in a third plane between the first and second planes, wherein the third set of electrodes is rotatable around an axis intersecting the third plane.
2. The system of claim 1, further comprising a current source configured to inject current between at least one electrode of the first set of electrodes and at least one electrode of the second set of electrodes.
3. The system of claim 2, further comprising one or more switches that are configured to selectively connect each one of the electrodes of the first set of electrodes to each one of the electrodes of the second set of electrodes.
4. The system of claim 3, further comprising a processor configured to control the switches.
5. The system of claim 1, further comprising a current source configured to inject current between a first electrode of the third set of electrodes and a second electrode of the third set of electrodes.
6. The system of claim 5, further comprising one or more switches that are configured to selectively connect the electrodes of the third set of electrodes to the other electrodes of the third set of electrodes.

7. The system of claim 6, further comprising a processor configured to control the switches.

8. The system of claim 1, further comprising a voltage measurement device configured to measure voltage between a first electrode of the third set of electrodes and a second electrode of the third set of electrodes.

9. The system of claim 8, further comprising one or more switches that are configured to selectively connect the electrodes of the third set of electrodes and the other electrodes of the third set of electrodes to the voltage measurement device.

10. The system of claim 9, further comprising a processor configured to control the switches.

11. The system of claim 8, wherein the voltage measurement device is an amplifier.

12. The system of claim 1, wherein the third set of electrodes is supported by an electrode supporting unit.

13. The system of claim 12, wherein the electrode supporting unit includes a first biasing element for biasing the electrodes radially inward and a second biasing element for biasing the electrodes radially outward.

14. The system of claim 13, wherein the electrode includes a storage container for conductive gel, and the electrode is configured such that gel stored in the storage container is expelled when the electrode is biased radially inward.

15. The system of claim 8, further comprising a processor configured to process the voltage measurements taken by the voltage measurement device so as to generate a current density distribution in the third plane.

16. The system of claim 15, wherein the processor is further configured to generate an image corresponding to the current density distribution in the third plane.

17. The system of claim 1, wherein the first, second and third sets of electrodes are mounted on upper and lower portions of an imaging device, the upper and lower portions being separable so as to enable a patient body part to be placed between the upper and lower portions.

18. The system of claim 2, wherein the current is a multi-frequency current.

19. The system of claim 15, wherein the third set of electrodes is moveable in an axial direction between the first and second planes to a fourth plane.

20. The system of claim 19, wherein the processor is further configured to process the voltage measurements taken by the voltage measurement device so as to generate a current density distribution in the fourth plane.

21. The system of claim 20, wherein the processor is further configured to generate a three-dimensional image corresponding to the current density distribution between the first and second planes.

22. The system of claim 20, wherein the voltage measurement device is configured to measure voltage using a signal synchronized with the R wave of an

electrocardiogram.